

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

**Claim 1. (Cancelled)**

**Claim 2 (Cancelled)**

**Claim 3 (Cancelled)**

**Claim 4 (Cancelled)**

**Claim 5 (Cancelled)**

**Claim 6 (Cancelled)**

**Claim 7 (Cancelled)**

**Claim 8 (Currently Amended)** A method of storing data in the form of holograms in a crystal, comprising;

providing a cylindrical crystal formed about an axis, the crystal having an axially facing surface and a peripheral surface extending transverse to the axially facing surface;

from a source of laser light, providing a signal beam containing the data and focusing the signal beam through the axially facing surface of the cylindrical crystal;

from a source of laser light, providing reference beam and focusing the reference beam through the peripheral surface of the cylindrical crystal to interfere with the signal beam and thereby write a hologram in the cylindrical crystal, ~~and~~ ;

rotating the cylindrical crystal and laser light with respect to one another about the axis ~~thereof of the cylindrical crystal~~ to write additional holograms in the cylindrical crystal in an annular array;

indexing the crystal axially with respect to the beams to write numerous annular arrays stacked axially within the crystal;

reading the hologram out of the crystal by passing a reference beam therethrough to diffract from the holograms and produce a diffracted beam including the data of the holograms;

converting the transmitted reference beam to a phase conjugate beam that diffracts from the hologram, and

reading the phase conjugate beam with a detector.

**Claim 9        (Cancelled)**

**Claim 10       (Cancelled)**

**Claim 11       (Cancelled)**

**Claim 12       (Cancelled)**

**Claim 13       (Cancelled)**

**Claim 14       (Cancelled)**

**Claim 15       (Cancelled)**

**Claim 16       (Cancelled)**

**Claim 17       (Cancelled)**

**Claim 18       (Currently Amended)** An apparatus for reading holograms into a cylindrical crystal formed about an axis, comprising:

a source of laser light passing through a polarizing device;

an optical path for directing a reference beam into the crystal in a radial direction with respect to the axis of the crystal for interference with the holograms within the crystal to direct images of the holograms axially out of the crystal, and ;

a phase conjugate mirror positioned radially of the crystal to produce a phase conjugate beam containing the images that propagates back along the axis of the crystal, and

a detector positioned to receive the axially directed images.

**Claim 19 (Original)** The apparatus of claim 18 further including a support for the crystal, the support including a motor for rotating the crystal about the axis to read angularly spaced holograms therein.

**Claim 20 (Original)** The apparatus of claim 19 further including an axial translator associated with the support for moving the crystal axially to read holograms in layers axially spaced with respect to one another.

**Claim 21 (Original)** The apparatus of claim 20 wherein the detector is a charge coupled device.

**Claim 22 (Original)** The apparatus of claim 21 wherein the images of the holograms are coupled to the detector by a mirror reflecting the images transversely to the axis through a lens for focusing into the charge coupled device.

**Claim 23 (Cancelled)**

**Claim 24 (New)** A method of storing data in the form of holograms in a crystal, comprising;

- providing a cylindrical crystal formed about an axis, the crystal having an axially facing surface and a peripheral surface extending transverse to the axially facing surface;
- from a source of laser light, providing a signal beam containing the data and focusing the signal beam through the axially facing surface of the cylindrical crystal;
- from a source of laser light, providing reference beam and focusing the reference beam through the peripheral surface of the cylindrical crystal to interfere with the signal beam and thereby write a hologram in the cylindrical crystal;
- rotating the cylindrical crystal about the axis thereof to write additional holograms in the cylindrical crystal in an annular array;
- reading the holograms by passing a reference beam through the crystal and diffracting the reference beam from the holograms to produce a diffracted reference beam including the data of the holograms;
- converting the diffracted reference beam to a phase conjugate beam, and
- reading the phase conjugate beam with a detector.